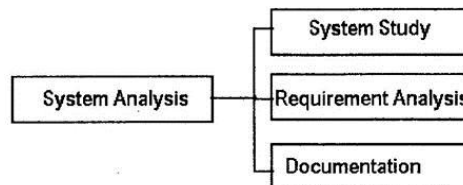


Segment 1: Concepts of System and its Environment

SYSTEM ANALYSIS

- Systems analysis consists of those activities that enable a person to understand and specify what the new system should accomplish.
- Systems analysis describes in detail the “what” that a system must do to satisfy the need or to solve the problem.



SYSTEMS DESIGN

- Systems design is the process of defining the architecture, components, modules, interfaces, and data for a system to satisfy specified requirements.
- In other words, systems design describes “how” the system will work. It specifies in detail all the components of the solution system and how they work together to provide the desired solution.

SYSTEM ANALYSIS AND DESIGN

- Systems analysis and design is a step-by-step process for developing high-quality information systems.

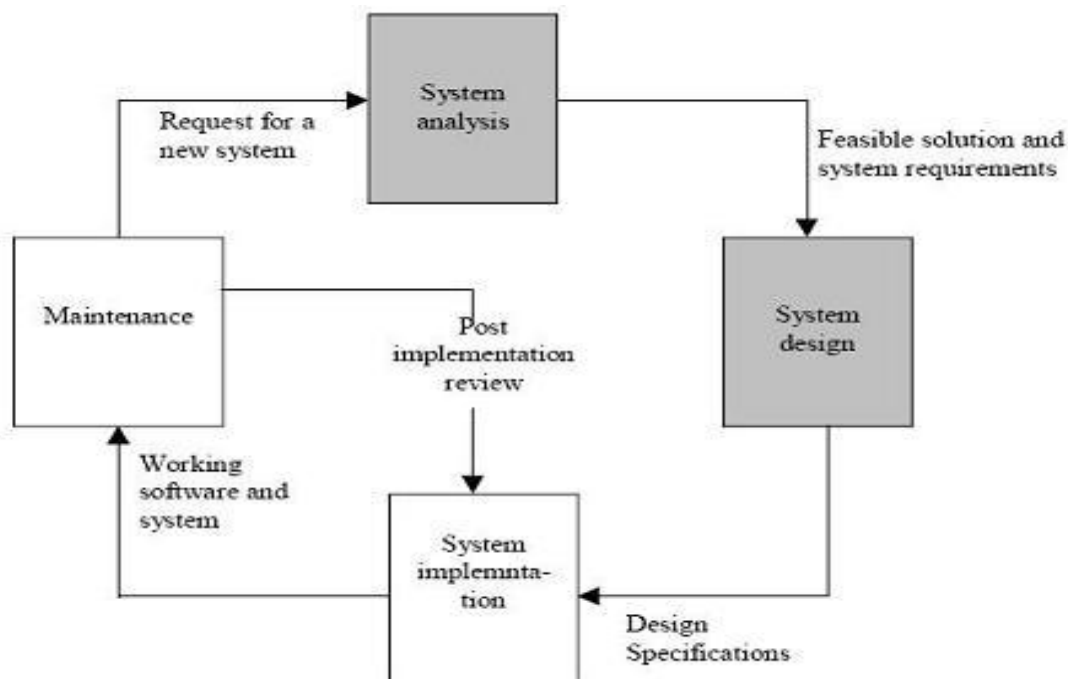


Figure: Stages in building an improved system

- System development can generally be thought of having **two major components**: systems analysis and systems design.
- After the proposed system is analyzed and designed, the actual implementation of the system occurs. After implementation, working system is available and it requires timely maintenance.

DATA, INFORMATION AND KNOWLEDGE

Data:

- Data is **raw unprocessed facts** and figures that have **no context or purposeful meaning**.
- Data is generally used by machines and is useless unless it is processed to create information.

Information:

- Information is **processed data** that is useful so that the decision maker may take necessary action.

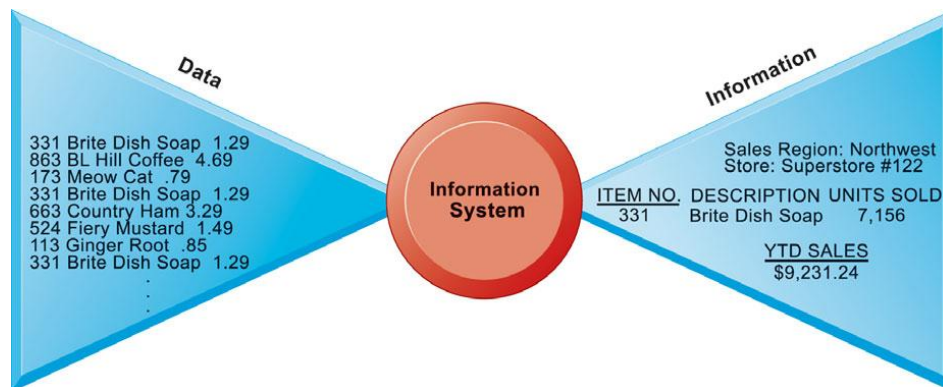


Figure: Data and information

Knowledge:

- **Data and information that is further refined based on the facts, truths, beliefs, judgments, experiences, and expertise of the recipient.**

SOURCES OF INFORMATION

Primary information:

- A primary source of information is one that provides data from **an original source** document. This may be as simple as **an invoice sent to a business or a cheque received**.
- There are many examples of primary sources in many walks of life, but generally a primary source is defined as being where a piece of information appears for **the first time**.

Secondary information:

- A secondary source of information is one that **provides information from a source other than the original**.

- Secondary sources are processed primary sources, second-hand versions. Examples of secondary sources could be, a bank statement that shows details of cheques paid in and out.

Internal information:

All organisations generate a substantial amount of information relating to their operation. This internal information is vital to the successful management of the organisation. The information may be available from a number of sources within the organisation.

For example: Marketing and sales information on performance, revenues, market shares, financial information on profits, costs, margins, cash flows, investments, etc.

External information:

An external source of information is concerned with what is happening beyond the boundaries of the organisation. This covers any documentation relating to a subject area produced as a summary or detailed report by an agency external to an organisation. Such information may be obtainable from government agencies or private information providers.

Examples might include: Telephone directories, Professional publications, etc.

TYPES OF INFORMATION

The three levels at which information can be used are strategic, tactical and operational and there is a direct correlation between the levels of importance of individuals or groups within an organisation.

Strategic information:

- Strategic information is used at the very top level of management within an organisation. These are chief executives or directors who have to make decisions for the long term.
- Strategic information is broad based and will use a mixture of information gathered from both internal and external sources.
- In general a timescale may be from one to five years or even longer depending on the project.

Tactical information:

- The next level down is the tactical level, and tactical planning and decision-making takes place within the guidelines set by the strategic plan.
- Tactical information is used by middle management (employees) when managing or planning projects.
- The timescale is usually at least between 6 months and 5 years (depending on the scale of the strategic project).
- Strategy refers to the “what” and “why” a company plans to do in the future, and tactical refers to “how” it plans to implement it.

Operational information:

- The lowest level is operational and operational planning takes place based on the tactical plans.

- The timescale is usually **very short, anything from immediately, daily or at most a week or month.**
- Needed for day to day operations of the organization.
- Results of operational work will usually be passed upwards to let the tactical planners evaluate their plans.

Table 1.1 Information Needs in Managing a Retail Store

| Type | Examples | Manager |
|---------------------------|--|-----------------------|
| Strategic unstructured | Should new branches be opened? Should the business be diversified? | Chief Executive |
| Tactical | How to rate vendors? Should credit limits of customers be changed? How much of each item should be stocked? How much should be re-ordered and from whom? Should new discount policies be introduced? | Middle Level Managers |
| Operational | List of items to be reordered List of defaulting customers Excess or deficient supply by vendors. List of late supplies by vendors. List of outstanding bills to be paid. Daily ledger accounts. | Line Managers |



Figure: Management Hierarchy and Information Needs

QUALITY/ CHARACTERISTICS OF INFORMATION

Good information is that which is used and which creates value. Experience and research shows that good information has numerous qualities.

- Availability/accessibility:** Information should be easy to obtain or access. A good example of availability is a telephone directory in Internet.
- Accuracy:** Information needs to be accurate enough for the use to which it is going to be put. The degree of accuracy depends upon the circumstances.
- Reliability:** Reliability deals with the truth of information or the objectivity with which it is presented.

- (d) **Relevance/appropriateness:** Information should be relevant to the purpose for which it is required.
- (e) **Completeness:** Information should contain all the details required by the user. Otherwise, it may not be useful as the basis for making a decision.
- (f) **Level of detail/conciseness:** Information should be in a form that is short enough to allow for its examination and use.
- (g) **Presentation:** Use attractive format & graphical charts..
- (h) **Up-to-date:** Include all data up to present time.
- (i) **Timing:** Information must be on time for the purpose for which it is required. **Information received too late will be irrelevant.**

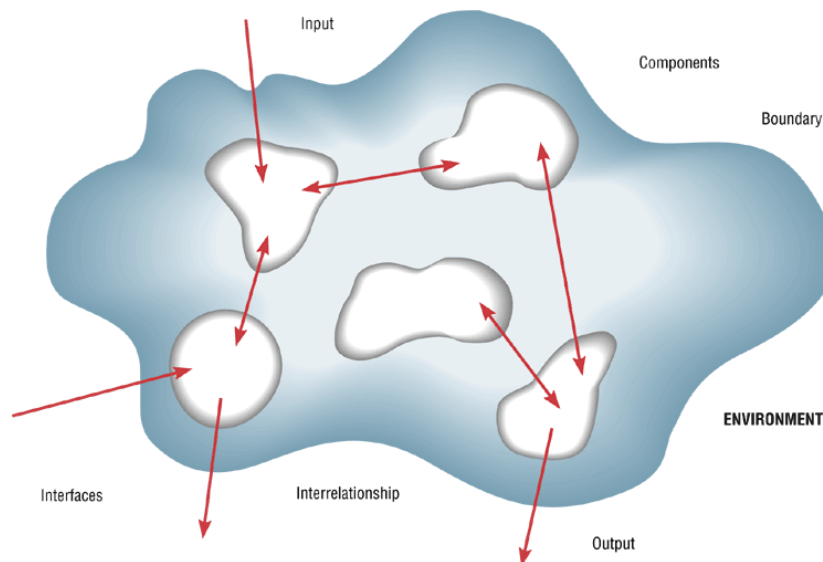
SYSTEM

- ✓ A system is a **group of interrelated components that function together to achieve a desired result.**
- ✓ For example, a system in the payroll department keeps track of checks, whereas an inventory system keeps track of supplies. The two systems are separate.

PARTS OF SYSTEM/ CHARACTERISTICS OF SYSTEM

A system has **nine characteristics**, seven of which are shown in Figure 1-4.

Figure 1.4 Seven Characteristics of a System



Component: A component is either an irreducible part or an aggregate of parts, also called a **subsystem**.

Interrelated components: The components are interrelated; that is, the function of one is somehow tied to the functions of the other systems.

Boundary: A system has a boundary, within which all of its components are contained and that establishes the **limits of a system**, separating it from other systems.

Purpose: The overall goal or function of a system.

Environment: Everything outside the system's boundary that influences the system.

Interface: The **points at which the system meets its environment** are called interfaces; an interface also occurs between subsystems.

Constraints: **The limits (in terms of capacity, speed, or capabilities) to what it can do.** Some of these constraints are imposed inside the system (e.g., a limited number of staff available), and others are imposed by the environment (e.g., due dates or regulations).

Output: Output transfers the processed information to the people who will use it or to the activities for which it will be used.

Input: Input captures or collects raw data from within the organization or from its external environment.

IMPORTANT SYSTEM CONCEPTS

Systems analysts need to know several other important systems concepts:

Decomposition:

Decomposition is a technique that allows the systems analyst to:

- **Break a system into small, manageable, and understandable subsystems**
- Focus attention on one area (subsystem) at a time, without interference from other areas
- Concentrate on the part of the system pertinent to a particular group of users, without confusing users with unnecessary details

Modularity:

- **Modularity is a direct result of decomposition.**
- It refers to dividing a system into chunks or modules of a relatively uniform size.
- Modules can represent a system simply, making it easier to understand and easier to redesign and rebuild.

Coupling:

- Coupling means that **subsystems are dependent on** each other.
- If one subsystem fails and other subsystems are highly dependent on it, the others will either fail themselves or have problems functioning.

Cohesion:

Cohesion is the extent to which a **subsystem performs a single function.**
In the MP3 player example, supplying power is a single function.

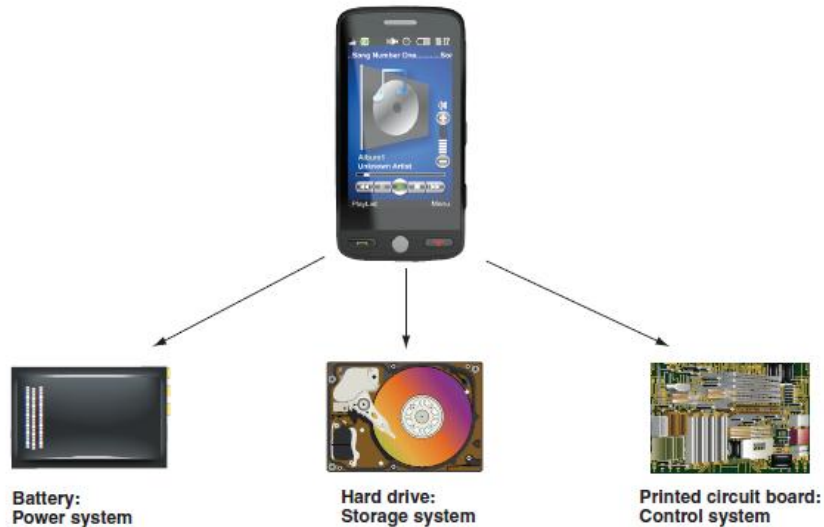


Figure : An MP3 player is a system with power supply, storage, and control subsystems.

INFORMATION SYSTEM

Information system may be defined as a set of devices, procedures and operating systems designed around user based criteria to produce information and communicate it to the users for planning, control and performance.

WHY INFORMATION SYSTEMS (IS) IS NECESSARY?

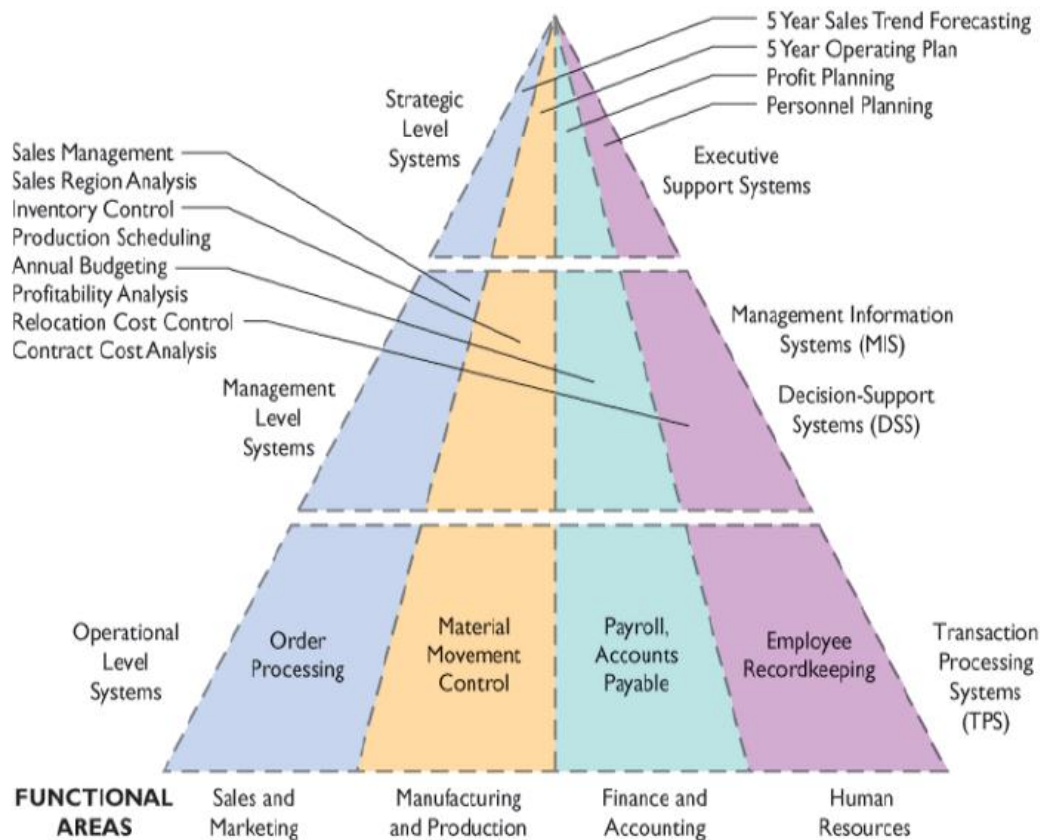
There are four reasons why IS makes a difference to the success of a business:

- ✓ Foundation of doing business:
Most businesses today could not operate without extensive use of information systems and technologies.
 - IT can help a business become a high-quality, low-cost producer.
 - IT is vital to the development of new products.
- ✓ Capital Management:
The success of your business in the future may well depend on how you make IT investment decisions.
- ✓ Productivity:
It is estimated that IT has increased productivity in the economy by about 1% in the last decade. For firms this means IT is a major source of labor and capital efficiency.
- ✓ Strategic Opportunity and Advantage:
 - Create competitive advantage
 - New Business Models
 - Create new services
 - Differentiate yourself from your competitors

TYPES OF INFORMATION SYSTEM

(A) Systems for different management groups

A business firm has systems to support different groups or levels of management. These systems include transaction processing systems and systems for business intelligence.



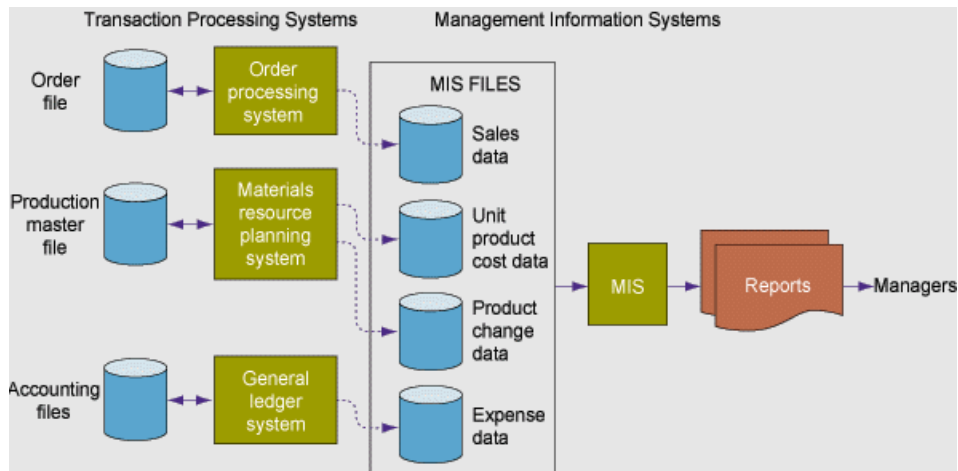
Transaction Processing Systems:

- TPS is used at the operational level where tasks are highly structured.
- TP systems process data generated by day-to-day business operations, such as sales order entry, hotel reservations, payroll, employee record keeping, and shipping.
- This provides high speed and accurate processing of record keeping of basic operational processes. These include calculation, storage and retrieval.
- Examples of TPS: Payroll systems, Reservation systems.

Management information systems (MIS):

- MIS summarize and report on the company's basic operations using data supplied by transaction processing systems.
- The term management information system (MIS) also designates a specific category of information systems serving middle management. MIS provide middle managers with reports on the organization's current performance. This information is used to monitor and control the business and predict future performance.

- MIS is an integrated man-machine system which collects, maintains, correlates and selectively display information in the proper time frame consistently, to meet the specific needs of managers, in order that decision could be made and action taken for fulfilling the objectives of an organization.
- Examples of TPS: **Inventory control systems, Human resource information system.**



In the system illustrated by this diagram, three TPS supply summarized transaction data to the MIS reporting system at the end of the time period. Managers gain access to the organizational data through the MIS, which provides them with the appropriate reports.

Consolidated Consumer Products Corporation Sales by Product and Sales Region: 2013

| PRODUCT CODE | PRODUCT DESCRIPTION | SALES REGION | ACTUAL SALES | PLANNED | ACTUAL versus PLANNED |
|--------------|---------------------|--------------|--------------|------------|-----------------------|
| 4469 | Carpet Cleaner | Northeast | 4,066,700 | 4,800,000 | 0.85 |
| | | South | 3,778,112 | 3,750,000 | 1.01 |
| | | Midwest | 4,867,001 | 4,600,000 | 1.06 |
| | | West | 4,003,440 | 4,400,000 | 0.91 |
| | TOTAL | | 16,715,253 | 17,550,000 | 0.95 |
| 5674 | Room Freshener | Northeast | 3,676,700 | 3,900,000 | 0.94 |
| | | South | 5,608,112 | 4,700,000 | 1.19 |
| | | Midwest | 4,711,001 | 4,200,000 | 1.12 |
| | | West | 4,563,440 | 4,900,000 | 0.93 |
| | TOTAL | | 18,559,253 | 17,700,000 | 1.05 |

Figure: sample MIS report

Decision-support systems (DSS):

- Information systems at the organization's management level that combine data and sophisticated analytical models or data analysis tools to **support semistructured and unstructured decision making.**
- Although DSS use internal information from TPS and MIS, they often bring in information from external sources, such as current stock prices or product prices of competitors.
- Use of **analytical and simulation models**
- Some artificial intelligence tools may be used

- Example: Financial Planning systems

Executive support systems (ESS):

- Information systems at the organization's strategic level designed to address unstructured decision making through advanced graphics and communications.
- ESS rely on the information generated by TPS, MIS, and DSS
- They address non-routine decisions requiring judgment, evaluation, and insight because there is no agreed-on procedure for arriving at a solution.
- ESS present graphs and data from many sources through an interface that is easy for senior managers to use. Often the information is delivered to senior executives through a portal, which uses a Web interface to present integrated personalized business content.
- ESS are designed to incorporate data about external events, such as new tax laws or competitors, but they also draw summarized information from internal MIS and DSS. They filter, compress, and track critical data, displaying the data of greatest importance to senior managers.



Figure: A digital dashboard of ESS

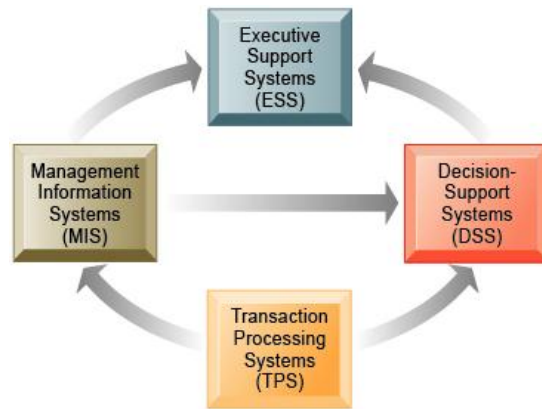


Figure: Relationship between/among systems for different management groups

(B) Systems for linking the enterprise

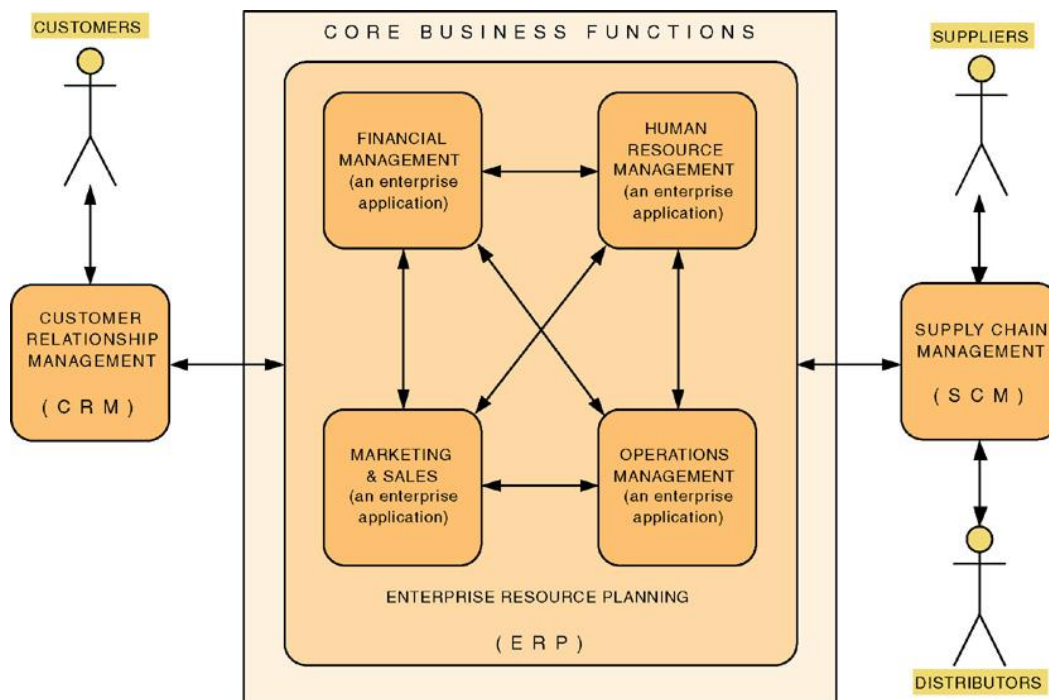


Figure: Relationship between/among systems for linking the enterprise

Enterprise Systems

- It is also known as enterprise resource planning (ERP) systems
- Enterprise systems integrate the key internal business processes of a firm into a single software system to improve coordination and decision making.
- Enterprise systems feature a set of integrated software modules and a central database that enables data to be shared by many different business processes and functional areas (manufacturing and production, finance and accounting, sales and marketing, and human resources) throughout the enterprise.

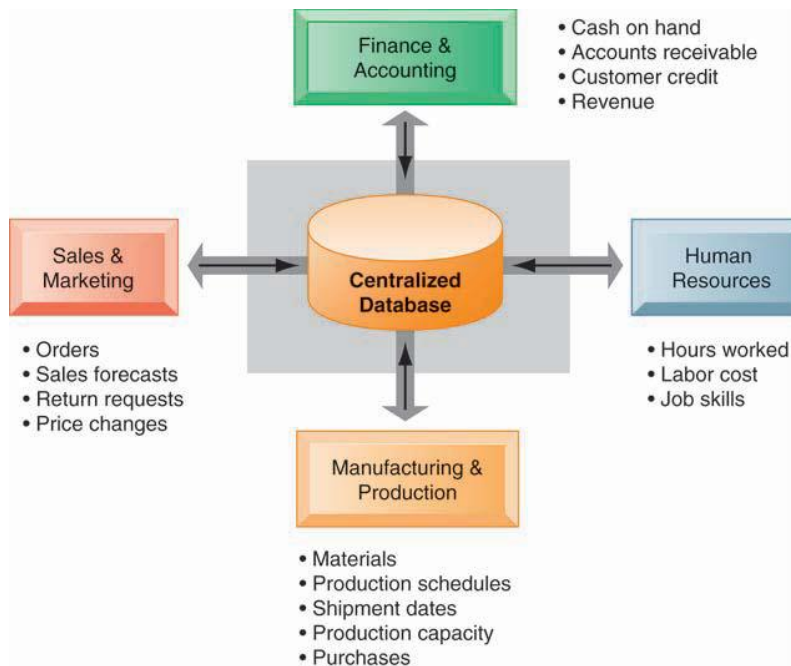


Figure: Enterprise Systems

Supply chain management (SCM) systems

- Information systems that automate the flow of information between a firm and its suppliers so they can use it to make better decisions about when and how much to purchase, produce, or ship.
- Supply chain management systems are widely used by manufacturing and distribution firms to connect to suppliers on a global basis
- The ultimate objective is to get the right amount of their products from their source to their point of consumption in the least amount of time and at the lowest cost.

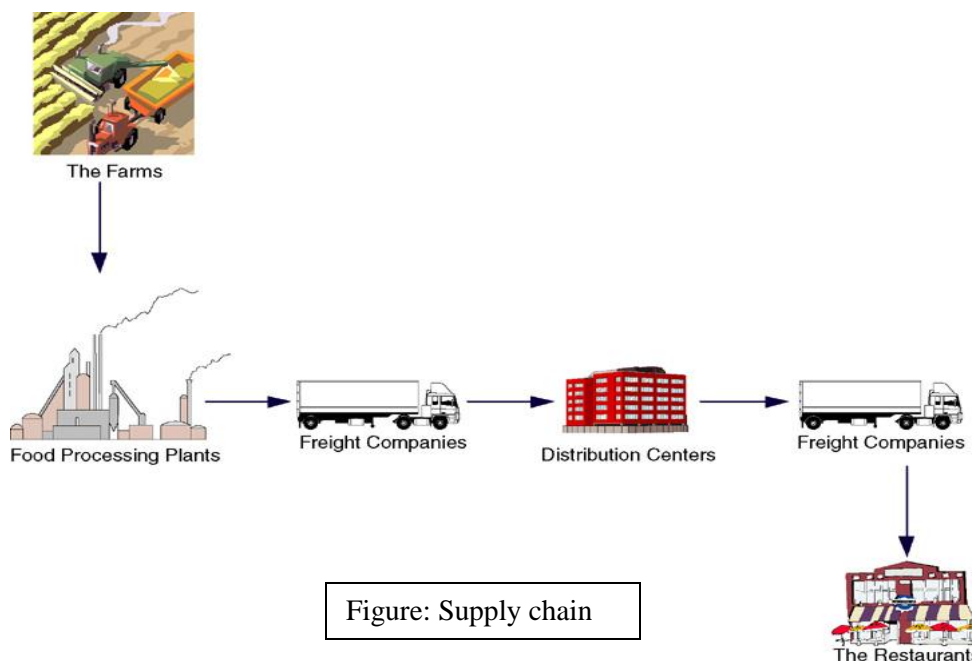


Figure: Supply chain



Figure: Supply chain management system

This figure illustrates the major entities in Nike's supply chain and the flow of information upstream and downstream to coordinate the activities involved in buying, making, and moving a product. Shown here is a simplified supply chain, with the upstream portion focusing only on the suppliers for sneakers and sneaker soles.

Customer relationship management (CRM) systems:

Information systems that track all the ways in which a company interacts with its customers and analyze these interactions to optimize revenue, profitability, customer satisfaction, and customer retention.

OTHER INFORMATION SYSTEMS

Expert system:

- An expert system is a computer system that emulates the decision-making ability of a human expert.
- Expert systems are designed to solve complex problems by reasoning about knowledge, represented mainly as if-then rules rather than through conventional procedural code.
- An expert system is divided into two subsystems: the inference engine and the knowledge base. The knowledge base represents facts and rules. The inference engine applies the rules to the known facts to deduce new facts. Inference engines can also include explanation and debugging abilities
- One example of an expert system is an artificial intelligence system that emulates an auto mechanic's knowledge in diagnosing automobile problems.

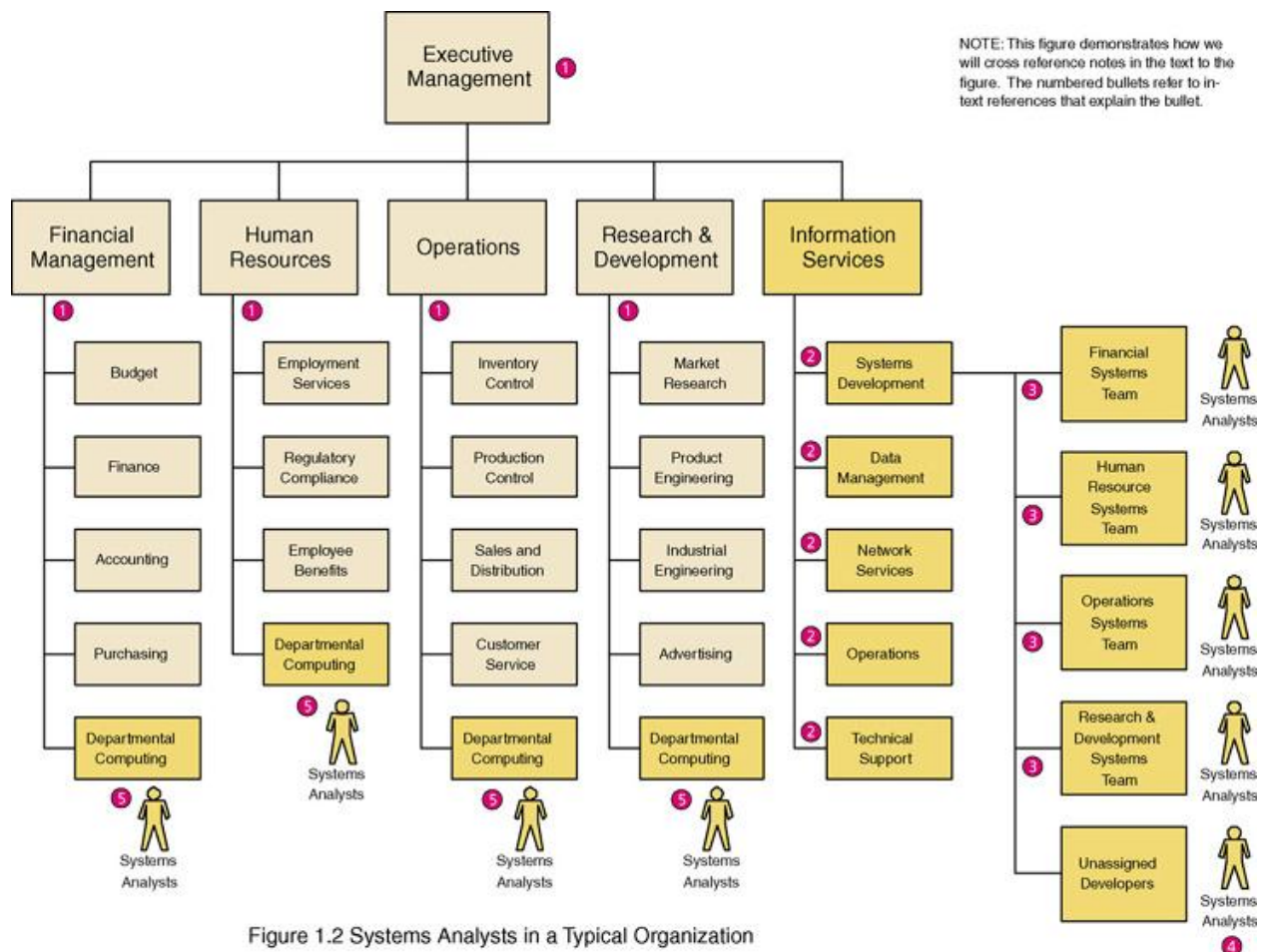
Knowledge Management Systems:

- Some firms perform better than others because they have better knowledge about how to create, produce, and deliver products and services.

- Knowledge management systems (KMS) enable organizations to better manage processes for capturing and applying knowledge and expertise. These systems collect all relevant knowledge and experience in the firm, and make it available wherever and whenever it is needed to improve business processes and management decisions. They also link the firm to external sources of knowledge.

THE SYSTEMS ANALYST

- A systems analyst investigates, analyzes, designs, develops, installs, evaluates, and maintains a company's information systems.
- To perform those tasks, a systems analyst constantly interacts with users and managers within and outside the company.



ROLE/RESPONSIBILITIES OF SYSTEM ANALYST

The analyst must be able to work with people of all descriptions and be experienced in working with computers. The analyst plays many roles, sometimes balancing several at the same time.

- The systems analyst's job overlaps business and technical issues. Analysts help translate business requirements into IT projects.

- When assigned to a systems development team, an analyst might help document business profiles, review business processes, select hardware and software packages, design information systems, train users, and plan e-commerce Web sites.
- A systems analyst **plans projects, develops schedules, and estimates costs.**
- To keep managers and users informed, the analyst conducts meetings, delivers presentations, and writes memos, reports, and documentation.

QUALITIES OF SYSTEMS ANALYST

A successful systems analyst needs technical knowledge, oral and written communication skills, an understanding of business operations, and critical thinking skills. Educational requirements vary widely depending on the company and the position.

Technical knowledge:

- **State-of-the-art knowledge is extremely important in a rapidly changing business and technical environment.**
- There are some websites that offer numerous opportunities to update technical knowledge and skills. Many sites offer a convenient way for IT professionals to learn about technical developments, exchange experiences, and get answers to questions.
- Analysts also maintain their skills by attending training courses, both **on-site and online.**
- Networking with colleagues is another way to keep up with new developments, and membership in professional associations also is important.

Communication skills:

Often, the analyst must work with people outside the company, such as software and hardware vendors, customers, and government officials. A systems analyst needs **strong oral and written communication skills**, and the ability to interact with people at all levels, from operational staff to senior executives.

Business skills:

- A systems analyst works closely with managers, supervisors, and operational employees. To be effective, he or she must **understand business operations and processes, communicate clearly, and translate business needs into requirements that can be understood by programmers and systems developers.**
- A successful analyst is **business-oriented**, curious, comfortable with financial tools (software), and able to see the big picture.

Critical thinking skills:

- Critical thinking skills include the **ability to compare, classify, evaluate, recognize patterns, analyze cause-and-effect, and apply logic.**
- Critical thinkers often use a **what-if** approach, and they have the ability to evaluate their own thinking and reasoning.
- **Critical thinking skills are valuable in the IT industry**, where employers seek job candidates who can demonstrate these skills and bring them to the workplace.

Education:

- Companies typically require systems analysts to have a college degree in information systems, computer science, or management information system, and some IT experience usually is required.
- For higher-level positions, many companies require an advanced degree. Sometimes, educational requirements can be waived if a candidate has significant experience, skills, or professional certifications.

STAKEHOLDERS' PERSPECTIVES ON AN INFORMATION SYSTEM

- 1) **System owners** – an information system's sponsor and executive advocate, usually responsible for funding the project of developing, operating, and maintaining the information system.
- 2) **System users**
 - Internal system users*
 - Clerical and service workers
 - Technical and professional staff
 - Supervisors, middle managers, and executive managers
 - External system users*
 - Customers
 - Suppliers
 - Partners
 - Employees
 - ✓ Remote users – users who are not physically located on the premises but who still requires access to information systems.
 - ✓ Mobile users – users whose location is constantly changing but who requires access to information systems from any location
- 3) **System designer** – a technical specialist who translates system users' business requirements and constraints into technical solution. She or he designs the computer databases, inputs, outputs, screens, networks, and software that will meet the system users' requirements.
- 4) **System builders** – a technical specialist who constructs information systems and components based on the design specifications generated by the system designers.
- 5) **Systems analyst** - A systems analyst investigates, analyzes, designs, develops, installs, evaluates, and maintains a company's information systems.
- 6) **External service provider (ESP)** – a systems analyst, system designer, or system builder who sells his or her expertise and experience to other businesses to help those businesses purchase, develop, or integrate their information systems solutions; may be affiliated with a consulting or services organization.
- 7) **Project manager** – an experienced professional who accepts responsibility for planning, monitoring, and controlling projects with respect to schedule, budget, deliverables, customer satisfaction, technical standards, and system quality.